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**METHOD AND APPARATUS FOR CREATING AND DELIVERING AN  
ATOMIC REMOTE CONTROL MACRO**

**BACKGROUND OF THE INVENTION**

**1. Technical Field:**

The present invention relates generally to an improved data processing system and in particular to a method and apparatus for remotely controlling devices. Still more particularly, the present invention provides a method, apparatus, and computer instructions for controlling devices through a remote control system.

**2. Description of Related Art:**

Devices, such as video and audio components in a home theater system, may be controlled remotely. Each of these devices typically comes with a remote control that is designed to control that particular device. When many devices or components are present, the number of remote controls makes controlling these devices difficult. As a result, many remote controls are designed to allow the control of more than one device. Several techniques are employed to allow a single remote control to control multiple devices. For example, some remote controls are programmed with a series of infra-red (IR) codes for other devices. Further, a "smart" remote control may be used in which this control is configured to learn other remote control IR codes. Additionally, a smart remote control also may have macro and programming capabilities for controlling different components.

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In controlling devices, a macro is a series of codes or instructions that are transmitted in response to the selection of the macro for execution through the push of a button. A macro provides a user an ability to perform or initiate a sequence of ordered events across several components through a single button push. The use of macros provides a benefit for users with two or more components in a home theater or entertainment system.

Many programmable remote controls have an ability to allow the user to create a macro through the remote control itself as well as having an interface to allow a macro to be downloaded to the remote control. These macros may be created on and downloaded from a home computer. In this manner, a user may create a complex macro to turn on selected components and set those components to various states to play a movie on the home entertainment system.

With the advantage of using macros, a disadvantage is present. In order for a macro to function correctly, the remote control must be directed or pointed at the set of components for the duration of the macro. In other words, the remote control must be positioned to send codes to the components the entire time the macro is executed. If the direction changes while the macro is running, one or more IR codes may be missed by some of the components in the system. This situation renders the macro useless and may place the home entertainment system into an unknown state. Subsequently, the user either must find the old remote controls for the components and reset the components to a known state or manually reset

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each of the devices. Larger macros have a greater chance of failure.

For example, with a macro that only powers on and off a set of components, the sequence of codes is unimportant. In another example, the macro may power on a television, a digital versatile disc (DVD) player, and a receiver. In turning on the receiver, a delay of four seconds may be programmed into the macro to allow the receiver to reach the power on state. Thereafter, the macro may then send a code to select an input mode for the receiver and then place the DVD player in a play mode. Execution of the macro may take, for example, five seconds. An unsuspecting user may cause the execution of the macro to fail by pressing the button for the macro and then placing the remote in a place where the remote transmits codes that are not received by the components or the transmission of the codes are blocked by some other source of interference, such as another person walking in front of the remote. As a result, the receiver may be turned on, but the appropriate input may not be selected. In turn, the DVD player may not reach the play mode or the DVD may be played with the receiver using the wrong input.

Therefore, it would be advantageous to have an improved method, apparatus, and computer instructions for creating macros and executing macros in a entertainment system.

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### **SUMMARY OF THE INVENTION**

The present invention provides a method in a signaling device for delivering codes to control multimedia devices. In response to receiving a signal from a remote control device, a macro corresponding to the signal is identified, the identified macro contains a set of codes used to control a set of multimedia devices. The set of codes is transmitted, wherein the set of codes causes a series of events to occur in the set of multimedia devices.

**BRIEF DESCRIPTION OF THE DRAWINGS**

The novel features believed characteristic of the invention are set forth in the appended claims. The invention itself, however, as well as a preferred mode of use, further objectives and advantages thereof, will best be understood by reference to the following detailed description of an illustrative embodiment when read in conjunction with the accompanying drawings, wherein:

**Figure 1** is a diagram illustrating components used in creating and executing macros in accordance with a preferred embodiment of the present invention;

**Figure 2** is a diagram illustrating a relay unit in accordance with a preferred embodiment of the present invention;

**Figure 3** is a diagram illustrating functional components for creating and delivering macros in accordance with a preferred embodiment of the present invention; and

**Figure 4** is a flowchart of a process for managing macros in accordance with a preferred embodiment of the present invention.

**DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT**

With reference now to the figures and in particular with reference to **Figure 1**, a diagram illustrating components used in creating and executing macros is depicted in accordance with a preferred embodiment of the present invention. In this example, home theater system **100** includes TV **102**, DVD player **104**, cable/satellite receiver **106**, compact disc (CD) player **108**, digital video recorder (DVR) unit **110**, and receiver **112**. Home theater system **100** may be any collection of two or more independent devices that are controlled through a single control unit.

Additionally, home theater system **100** also includes relay unit **114**. Relay unit **114** may transmit codes to the various components using an IR transmitter and/or a radio frequency (RF) transmitter contained within relay unit **114**. Additionally, relay unit **114** may transmit these codes to the various components using other types of protocols, in addition to or in place of IR or RF signals, such as Fire Wire or universal serial bus (USB). Fire Wire is a transfer protocol specified by IEEE 1394. Relay unit **114** is positioned to transmit codes to the different components in home theater system **100**. Macros for controlling the components in home theater system **100** are stored within relay unit **114**.

These macros may be created and uploaded from different sources. For example, macros may be created within data processing system **116** and uploaded to relay unit **114**. Further macros may be obtained using data

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processing system **116** to access preprogrammed macros from a website. The interface within relay unit **114** may be, for example, through a universal serial bus (USB) or a wireless interface, such as a IR interface.

Alternatively, the macros may be generated at data processing system **116** and then loaded onto remote control **118**. In turn, the macro may then be transmitted to relay unit **114** from remote control **118**. The transmission of this macro may take place using IR or RF signals, depending on the particular implementation. Further, these macros may be received by remote control **118** from remote controls **120**, **122**, and **124**.

Relay unit **114** may store multiple macros for execution. For example, one macro may cause the transmission of codes to sequentially turn on TV **102**, turn on DVD player **104**, turn on receiver **112**, wait for three seconds, select the DVD input in receiver **112**, and then place DVD player **104** into a play mode. Another macro may cause the transmission of codes to turn on TV **102**, turn on DVR unit **110**, turn on receiver **112**, wait for three seconds, and select the DVR input in receiver **112**. Each of these macros may be associated with a code or a command that causes execution of the macro by relay unit **114**.

In these examples, relay unit **114** acts as an intermediary that receives a single atomic command or code from remote control **118**. This code identifies a macro stored within relay unit **114** for execution. In response, relay unit **114** executes the macro identified or selected by remote control **118**. Execution of this macro

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may occur without requiring remote control **118** to be pointed at the different components in home theater system **100**. As a result, the user may move or set down remote control **118**, while relay unit **114** transmits a series of codes to various components in home theater system **100**. As a result, execution of the macro by relay unit **114** completes and the components in home theater system **100** remain in a known state.

With reference now to **Figure 2**, a diagram illustrating a relay unit is depicted in accordance with a preferred embodiment of the present invention. This relay unit may be implemented in home theater system **100** as relay unit **114** in **Figure 1**. In this example, a bus system is used to interconnect different components within the relay unit.

In this illustrative example, the relay unit includes processing unit **204**, transmitter **206**, receiver **208**, memory **210**, storage **212**, and upload interface **214** which are all interconnected by the bus system. Processing unit **204** executes instructions used to provide the features of the present invention. These instructions may be located within memory **210**. Memory **210** may be, for example, a random access memory (RAM). Macros and instructions for other processes may be stored in storage **212**. In these examples, storage **212** may take different forms, such as a hard disc drive or a nonvolatile access memory (NVRAM). These macros and instructions may be loaded into memory **210** for execution by processing unit **204**.



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Transmitter **206** is used to send codes to different components in a home theater system. In these examples, transmitter **206** may take the form of an IR transmitter. Receiver **208** may receive codes or commands from a remote control, such as remote control **118** in **Figure 1**. Upload interface **214** is employed to receive macros and may be, for example, a USB interface or an RF interface. Further, depending on the particular implementation, receivers may be received through receiver **208**.

Turning now to **Figure 3**, a diagram illustrating functional components for creating and delivering macros is depicted in accordance with a preferred embodiment of the present invention. Macro creation process **300** is used to create macros for use in a home theater system, such as home theater system **100** in **Figure 1**. This process may be implemented in a data processing system, such as data processing system **116** in **Figure 1**, or in a remote control, such as remote control **118** in **Figure 1**. A macro created through macro creation process **300** may be created and stored in macros **302** for code transmission process **304**. Code transmission process **304** may be found in a relay unit, such as the relay unit in **Figure 2**.

Alternatively, a macro created through macro creation process **300** may be sent to remote control **306** and stored in macros **308**. Remote control **306** may be, for example, remote control **118** in **Figure 1**. Macros **308** may then be sent to code transmission process **304**. When a code or command is received by code transmission process **304**, a determination is made as to whether the code or command corresponds to a macro stored in macros **302**. If

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a macro corresponding to the code or command is found, that macro is executed.

Turning now to **Figure 4**, a flowchart of a process for managing macros is depicted in accordance with a preferred embodiment of the present invention. The process illustrated in **Figure 4** may be implemented in a process, such as code transmission process **304** in **Figure 3**.

The process begins by waiting to receive a signal (step **400**). When a signal is received, a determination is made as to whether a macro is to be played or executed (step **402**). If the macro is to be played, the macro is identified (step **404**), and codes are transmitted (step **406**) with the process then returning to step **400**.

With reference again to step **402**, if the signal does not indicate that the macro is to be played, a determination is made as to whether the signal indicates that a macro is to be uploaded (step **408**). If a macro is to be uploaded, a code is received (step **410**). In these examples, the code may be received through various interfaces, such as a USB interface or an IR interface. Thereafter, a determination is made as to whether the macro is complete (step **412**). The determination in step **412** is made by examining the code received from the source of the macro being uploaded. If the code does not indicate that the macro is complete, this code is then stored as part of the macro (step **414**).

With reference again to step **412**, if the macro is complete, the process then returns to step **400**. Turning

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back to step **408**, if the macro step is not to be uploaded, the process also returns to step **400**.

Thus, the present invention provides an improved method, apparatus, and computer instructions for creating and delivering remote control macros. The mechanism of the present invention provides these features through the use of a relay unit. This relay unit receives a command from a remote control to execute a macro. In response to receiving this command, a macro corresponding to the command is identified by the relay unit. In response to identifying the macro, the macro is executed. The execution of this macro may occur without requiring the remote control to remain in a position to transmit codes to the different devices in the home theater system. Instead, the relay unit transmits the codes to the different components in the home theater system. As a result, if the remote control is repositioned or put down while the macro is executing the macro, it may still finish execution because the codes are transmitted by the relay unit.

It is important to note that while the present invention has been described in the context of a fully functioning data processing system, those of ordinary skill in the art will appreciate that the processes of the present invention are capable of being distributed in the form of a computer readable medium of instructions and a variety of forms and that the present invention applies equally regardless of the particular type of signal bearing media actually used to carry out the distribution. Examples of computer readable media

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include recordable-type media, such as a floppy disc, a hard disc drive, a RAM, CD-ROMs, DVD-ROMs, and transmission-type media, such as digital and analog communications links, wired or wireless communications links using transmission forms, such as, for example, radio frequency and light wave transmissions. The computer readable media may take the form of coded formats that are decoded for actual use in a particular data processing system.

The description of the present invention has been presented for purposes of illustration and description, and is not intended to be exhaustive or limited to the invention in the form disclosed. Many modifications and variations will be apparent to those of ordinary skill in the art. The embodiment was chosen and described in order to best explain the principles of the invention, the practical application, and to enable others of ordinary skill in the art to understand the invention for various embodiments with various modifications as are suited to the particular use contemplated.